

APPENDIX B
Summary of Modifications to the
California Exhaust Emission Standards and Test Procedures
for 1988 and Subsequent Model PCS, LDTs, and MDVs

This Appendix is divided into three sections: 1) discussion of the restructuring of the current light- and medium-duty test procedures for CAP 2000; 2) discussion of the proposed LEV II and CAP 2000 modifications to the new light- and medium-duty test procedures; and 3) discussion of the proposed ZEV and HEV modifications.

1. Description of Reorganization of the Current LDV/MDV Test Procedures

The current California emission standards, certification requirements and test procedures are contained in the “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” (hereinafter “current LDV/MDV TPs”) which references Subpart A of Title 40, Code of Federal Regulations (“CFR”). Under CAP 2000, however, the federal emission standards and light-duty vehicle certification requirements will be contained in a new section, 40 CFR Subpart S and Subpart A will no longer apply to light-duty vehicles beginning in the 2001 model year. Therefore, the “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” has been substantially reorganized in a new document, “California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles” (hereinafter “proposed LDV/MDV TPs”) to align with the new 40 CFR Subpart S requirements. The following is a detailed explanation of the proposed modifications.

Although the current LDV/MDV TPs reference 40 CFR Subpart A, the document is not organized in the same structure as Subpart A. Consequently, the differences between the federal and California programs are not easy to discern. For this reason, the proposed LDV/MDV TPs follow very closely the structure of Subpart S so that differences between the California and federal programs can be easily determined. It is important to note that none of the current emission standards and California-specific test requirements has been amended under CAP 2000; this section only discusses how the current LDV/MDV TPs document has been reorganized. Also, the section numbering convention for Subpart S is different than that used in Subpart A. Whereas in Subpart A the applicable model year was first followed by the section number (e.g., 86.094-24), Subpart S references the section first and then the applicable model year (e.g., 86.1802-01).

To align with Subpart S, the current LDV/MDV TPs document was reorganized into two parts:

Part I -General Provisions for Certification and In-Use Verification of Emissions which contains the California amendments to 40 CFR Subpart S;

Part II - Test Procedures which contain the California amendments to 40 CFR Subparts B (the federal test procedures) and C (the cold carbon monoxide test procedures) and also includes two California procedures: emission testing procedure at 50°F and the procedure for determining the specific reactivity of automotive exhaust.

The requirements and test procedures for ZEVs and HEVs have been placed in a new document: the “California Zero-Emission and Hybrid Electric Vehicle Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles (hereinafter “ZEV TPs”). Amendments to these test procedures are discussed in section B.3 of this Appendix.

In order to differentiate the federal requirements from those in California, a different numbering convention was employed. Whereas the federal requirements are set forth as I.A.(1)(a), the California requirements are set forth as 1.1.1.1. Where a California requirement amends the federal rule, the California language “amends” Subpart S. Where the requirement is California only, the requirement is “added” to the Subpart.

The following section numbers (in **bold** text) correspond to the current LDV/MDV TPs with the Subpart S reference and proposed LDV/MDV TPs sections in brackets [e.g., §86.1801-01; I-A.1.1)].

1. Applicability. [§86.1801-01; §86.1802-01; I-A.1, 2, and 3]. Although the language has been re-arranged to reflect the organizational structure of the Subpart S, there has been no change in the applicability as it pertains to California except that the new test procedures begin in the 2001 model year and the definition of small volume manufacturer, which used to be in a different section in Subpart A, is now under §86.1801-01. Current California requirements have different definitions for small volume manufacturer. Under CAP 2000, the cutpoint for small volume manufacturer is now 4,500 units based on a three year running average for all California requirements.

2. Definitions. [§86.1803-01; I-B.1,2 and 3] Definitions that are already contained in 40 CFR §86.1803-01 have been deleted from the current test procedures to avoid duplication. Only definitions that are different from those in the CFR or apply only to California are contained in the new test procedures. The only deviation from this is the definition of “useful life” which has been removed from the definition section of the CFR and is contained in 40 CFR §86.1805-01. The California definition is now in Section C.1 of the new test procedures.

3. Emission Standards. [§86.1810-01 - §86.1815-01; I-D and I-E.1,2,3,4 and 5] The general standards contained in 40 CFR §86.1810-01 (e.g., SFTP general provisions, explanation of NMOG, etc.) are in Section D of the proposed LDV/MDV TPs. The federal emission standards contained in §§86.1811-01 through 86.1815-01 have been deleted. California-specific exhaust emission standards (tailpipe, SFTP, standards for fuel flexible vehicles on gasoline, 50°F, cold CO, highway NOx) are in Section E of the proposed LDV/MDV TPs along

with fleet average requirements, phase-in requirements, intermediate in-use standards and Reactivity Adjustment Factors (“RAFs”) (just the values). The ZEV requirements have been moved to the ZEV TPs.

4. Initial Requirements.

a. Application for Certification.

1. Under CAP 2000, California has harmonized its certification procedures with EPA; the information required in this subparagraph is set forth in 40 CFR §86.1840-01 [H.4].

2. This paragraph refers to the fuel trigger requirement for the introduction of alternative fuel vehicles and has been set forth in Section H.3 of the proposed LDV/MDV TPs. The last two lines of 4.a.2 refer to an EPA requirement for SEA testing that does not apply in California.

3. The HEV/ZEV application information is set forth in Section E.2 of the ZEV TPs.

4. This information in (1) is required in §86.1840(e)(5) [H.4] and the information in (2) is required in §86.1825(b)(1)(ii) [G.3].

5. Re: Certification Short Test. This section refers to the CST requirements set forth in §86.1825-01(b)(4)(iv) [G.3] that allow a manufacturer to request an alternative procedure to the CST. California does not have a certification short test but it does require Inspection and Maintenance (I/M) testing. Under CAP 2000, California is harmonizing with EPA and will allow manufacturers to submit a statement of compliance with the I/M test in lieu of actual test data.

b. Required Data

1. The RAF language is contained in Section H.1.2 and Part II.D of the proposed LDV/MDV TPs. The formaldehyde language has been omitted as it is already in the exhaust standards tables.

2. This language is contained in Section H.3.4 of the proposed LDV/MDV TPs.

c. Test Vehicles and Test Engines; Assigned Deterioration Factors (DFs)

1. This is no longer applicable under CAP 2000; the new test group definition is contained in 40 CFR §86.1823-01 [G-1].

2. The criteria for selection and testing of EDVs is contained in 40 CFR §86.1824-01 [G.2]. The SFTP language is also set forth §86.1824-01 [G.2]. The fifty-state requirement has been omitted because of the criterion that the EDV must be a worst case vehicle.

3. This no longer applies; however, under CAP 2000 manufacturers have the option to designate a certain number test groups as small volume which would then be subject to the small volume requirements in 40 CFR §86.1834-01[G.12].

4. The California requirements have been harmonized with the federal requirements and are contained in 40 CFR §86.1822-01[F.7]. The evaporative DF requirements have been moved to the “California Evaporative Emission Standards and Test Procedures for 2001 and Subsequent Model Motor Vehicles” (Evaporative TPs).

5. Carryover is permitted under 40 CFR §86.1835-01; the California requirements have been harmonized with EPA [G.13].

6. The I/M requirement has been moved to Section G.3.1.2 of the proposed LDV/MDV TPs.

5. Maintenance Requirements

a. Maintenance

All of the maintenance requirements contained in this section have been harmonized with the EPA requirements contained in 40 CFR §86.1830-01[G.8.1]. The allowable maintenance requirements for HEVs are contained in Section G.8.2 of the proposed LDV/MDV TPs.

b. Maintenance Instructions

The requirements in this section have been harmonized with EPA in 40 CFR §86.1808-01[C.4].

c. Submission of Maintenance Instructions

The requirements in this section have been harmonized with EPA in 40 CFR §86.1840-01[H.4].

6. Demonstrating Compliance.

a. Mileage and Service Accumulation; Emission Measurements

1. The ZEV exemption has been moved to the ZEV TPs.

2. These requirements are set forth in 40 CFR §86.1827-01 [G.5]. The HEV requirements have been removed because under CAP 2000, manufacturers will be allowed to develop their own durability demonstrations that will more accurately reflect each individual hybrid design. The individual durability programs for HEVs must be have prior approval of the Executive Officer to ensure that the program reflects real world deterioration (see ZEV TPs for a discussion of the HEV durability demonstration.)

3. This requirement is contained in 40 CFR §86.1825(b) [G.3] (FTP and SFTP testing on EDV required) and §86.1827-01 [G.5] (stabilized EDV testing).

4. (A) The durability demonstration requirements are contained in 40 CFR §86.1819-01 [F.4]. Under CAP 2000, California and federal durability programs are the same. The HEV useful life language has been moved to Section C.1 of the proposed LDV/MDV TPs.
(B) The periodically regenerating trap oxidizer language has been omitted because manufacturers are allowed to create their own durability programs under CAP 2000.
(C) These requirements are contained in the Evaporative TPs.
(D) Again, since manufacturers are allowed to create their own durability programs, this language has been omitted.
(E) Carryover is allowed under CAP 2000 (40 CFR §86.1835-01) [G.13].
5. Again, this language has been omitted because manufacturers are allowed to perform their own durability demonstrations.
6. This is no longer applicable under CAP 2000.
7. This is no longer applicable under CAP 2000.

b. Compliance with Emission Standards [§86.1837-01]

1. In the applicability section of the proposed LDV/MDV TPs [I.A.2], language has been added that states that reference to light-duty vehicles shall mean passenger cars, and reference to light-duty trucks shall mean light-duty trucks and medium-duty vehicles to avoid having to clarify this throughout every CFR section. The ZEV compliance requirements have been moved to the ZEV TPs.
2. This requirement has been moved to Section H.3 of the proposed LDV/MDV TPs.
3. This requirement is no longer applicable under CAP 2000.
4. Deterioration factors are determined according to the requirements contained in 40 CFR §86.1819-01 [F.4].
5. In order to harmonize with EPA, California is deleting its outlier requirement and will be following the requirement set forth in 40 CFR §86.1819-01 [F.4].
6. These requirements are contained in 40 CFR §86.1819-01 [F.4].
7. Since manufacturers are allowed under CAP 2000 to create their own durability programs, this requirement has been deleted and the new procedure is contained in 40 CFR §86.1819-01 [F.4]. It should be noted that alternative durability programs (such as might be needed for trap oxidizer systems) must be pre-approved by the Executive Officer. It is assumed that manufacturers that choose to develop vehicles with trap technology, will need to obtain prior approval from the Executive Officer.
8. This requirement is contained in 40 CFR §86.1837-01 [H.1].
9. CAP 2000 has modified the requirements for light-duty trucks so that this exemption is no longer applicable. Subpart S does not apply to heavy-duty engines/vehicles which requirements are contained in Subpart A.

c. Prohibition of Defeat Devices. [§86.1809-01] This prohibition is contained in Section C.5 of the proposed LDV/MDV TPs.

7. Small Volume Manufacturer's Certification Procedures

This section has been deleted. The only difference now between the California and federal requirements is that the California definition is 4,500 units based on a three year running average while the federal is 15,000 units. The new small volume manufacturer requirements are contained in 40 CFR 86.1834-01 [G.12].

8. Alternative Procedures for Notification of Additions and Changes

The California and federal running change requirements have been harmonized and are contained in 40 CFR §86.1838-01 [H.2].

9. Test Requirements

All of the requirements in this section have been moved to Part II of the proposed LDV/MDV TPs. The California numbering convention begins with 100 to differentiate this section from Part I requirements and the California provisions are listed directly following the corresponding CFR section.

- a. Fuel Specifications.** The fuel specifications are contained in Part II.A.100.3.
- b. Road Load Power Test Weight.** These provisions are contained in Part II.A.100.5. The 10% air conditioning loading requirement for HEVs has been removed because of the requirement HEVs (and ZEVs as well) be tested on the single roll electric dynamometer (this language is in the ZEV TPs).
- c. Test Sequence; General Requirements.**
 - 1. This requirement has been superseded by 40 CFR §86.139-00.
 - 2. This requirement is contained in Part II.A.100.5.2.1.
 - 3. This requirement is contained in Part II.A.100.5.2.2.
- d. Vehicle Preconditioning**
 - 1. This requirement is contained in Part II.A.100.5.3.1.
 - 2. This requirement is contained in Part II.A.100.5.3.2.
 - 3. This requirement is contained in Part II.A.100.5.3.3.
- e. Regeneration Recording Requirements**

This section has been omitted because CAP 2000 allows manufacturers to develop their own durability demonstration which must be pre-approved by the Executive Officer. It is assumed that a manufacturer's durability program would include recording requirements in order to be approved by the Executive Officer.
- f. All-Electric Range Test Requirements**

This section has been moved to the ZEV TPs. It has been updated to include several elements of a Manufacturer's Advisory Circular that was scheduled for release last year.
- g. Determination of Battery Specific Energy for ZEVs.**

This section has also been moved to the ZEV TPs.

h. Calculations; exhaust emissions.

This calculation is contained in Part II.A.100.5.5.2 of the new TPs.

10. Optional 100,000 Mile Certification Procedure

This section is no longer applicable because manufacturers are allowed to develop their own durability demonstration under CAP 2000.

11. Additional Requirements

a. Alternative Durability Program. This option is no longer applicable under CAP 2000.

b. High Altitude Requirements. California has harmonized its high altitude requirements with EPA.

c. Highway Fuel Economy Test. This requirement is contained in Section G.3.3 of the proposed LDV/MDV TPs.

d. Labeling Requirements. This requirement is contained in Section C.3 of the new TPs.

e. Driveability and Performance Requirements. This requirement appears to be an artifact of certification prior to the days of catalysts and strict air/fuel metering over the FTP driving cycle. Therefore, it is being removed from the certification requirements.

f. Malfunction and Diagnostic System Requirements. This requirement is contained in Section C.2 of the new TPs.

g. Methanol and Formaldehyde Testing. This requirement only applied to 1990 through 1994 model year vehicles so it has been removed.

h. FFV Emission Testing. This requirement has been modified by CAP 2000 and is no longer applicable.

i. Scope of Certification. This requirement is contained in Section H.1.3 of the new TPs.

j. Statement on Production Vehicles. CAP 2000 has a similar requirement that each manufacturer will provide a statement at the time of certification that all vehicles comply with the applicable standards (40 CFR §86.1840-01; [H.4])

k. 50°F Requirement. The emission standards are contained in Section E.1.4; vehicle selection is contained in Section G.2.2 (40 CFR §86.1824-01); certification requirements in Section G.3.2 and the test procedures are contained in Part II.C.

l. Emission Control System Continuity at Low Temperature. This section is contained in Section C.5.2.

12. Identification of New Clean Fuels to be Used in Certification Testing. This section is contained in Part II.A.100.3.

13. Reactivity Adjustment Factors. The RAFs are contained in Section E.5; compliance with the standards is set forth in Section H.1.2; and the methods for determination of specific reactivity is contained in Part II.D.

14. Cold Temperature Test Procedure. This language is contained in Part II.B.

Appendices I through VII are no longer applicable because of the modifications of CAP 2000. Appendix VIII is contained in Part II.D of the new TPs. The MIR values have been removed from this document because they are already in the NMOG Test Procedures.

2. PROPOSED MODIFICATIONS TO LDV/MDV TPS FOR LEV II AND CAP 2000

The following discussion concerns the proposed amendments in the “California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles.”

A. Applicability. See discussion in Section B.1., above.

B. Definitions.

1. The definitions of “**heavy-duty vehicle**,” “**light-duty vehicle**,” and “**medium-duty vehicle**” have been amended to reflect the change in cutpoint from 6,000 lbs. GVW to 8,500 lbs. GVW in the light- and medium-duty vehicle categories being proposed as a result of the proposed LEV II standards.

2. The definition of “**intermediate volume manufacturer**” has been updated to reflect the CAP 2000 amendment to the definition of small volume manufacturer from 3,000 to 4,500 and also reflects changes in sales volume of some intermediate volume manufacturers from the 1989 through 1993 definition.

3. The word “persons” has been added to the definition of “**light-duty truck**” to reflect the increasing usage of light-duty trucks and sport utility vehicles for personal transportation.

4. The definitions of “**Type A, Type B and Type C hybrid electric vehicle**” have been deleted because of changes to the determination of credits for hybrid electric vehicles. See Part II of the Staff Report for a discussion of the proposed changes.

C. General Requirements for Certification

1. Under LEV II, staff is proposing the extension of useful life from 100,000 to 120,000 miles for light-duty vehicles and a reduction of the useful life from 11 years to 10 years for medium-duty vehicles. Also, for purposes of in-use testing, the definition of full useful life of the auxiliary power unit for hybrid electric vehicles has been amended. See Part II of the Staff Report for a discussion of the proposed HEV changes.

E. Exhaust Emission Standards

1. **LEV II Standards.** Part of the LEV II proposal includes an optional 150,000 mile standard that enables manufacturers to achieve extra credit for certifying to these standards. The LEV II proposal also proposed that SULEVs that meet certain criteria be eligible for a partial ZEV allocation. See Part II of the Staff Report for a discussion of these proposed changes.

2. **Exemption of HEVs.** The exemption for hybrid electric vehicles for 50°F testing and cold CO emission standards has been removed. See Part II of the Staff Report for a discussion of the proposed changes.

3. **Rounding of Highway NOx.** The current rounding of highway NOx emissions to the nearest tenth of a gram has been updated to include rounding to the nearest hundredth of a gram because the proposed LEV II NOx standards are 0.05 and 0.02.

4. **HEV NMOG Factor and MDV HEV VEC Factor.** These factors replace the current HEV Contribution Factor designation. See the Staff Report for a discussion of these factors.

5. **Calculation of NMOG Credits.** In order to provide manufacturers with additional flexibility when introducing LEV II vehicles, staff is proposing a three year grace period in which debits may accrue without penalty. Beginning in 2007, however, manufacturers must equalize any debits by the end of the following model year.

F. Requirements and Procedures for Durability Demonstration

1. **Durability Group Determination.** Staff does not anticipate that the emissions deterioration of HEVs and vehicles certifying to the optional 150,000 mile standards will be similar to that of conventional vehicles. In order to ensure that the durability demonstration is representative, staff is proposing that HEVs and vehicles certifying to the optional 150,000 mile standards be placed in their own durability groups.

G. Procedures for Demonstration of Compliance with Emission Standards

1. **Test Group Determination.** Although HEVs and vehicles certifying to the optional 150,000 mile standards have the same emission standard, staff expects that the emission control systems of HEVs and vehicles certifying to the optional 150,000 mile standards will likely be somewhat different than their conventional vehicle counterparts. Therefore, staff is proposing that HEVs and vehicles certifying to the optional 150,000 mile standards be placed in their own test groups.

2. **I/M Requirements.** This modification provides manufacturers with sufficient lead time to incorporate any changes that may occur to the California I/M requirements.

H. Certification, Information and Reporting Requirements

1. Manufacturers must demonstrate compliance with the standards at a vehicle's intermediate and full useful life. Because the LEV, ULEV and SULEV SFTP standards only apply at 4,000 miles, full and useful life has been amended to mean 4,000 miles for SFTP testing only.

I. In-Use Compliance Requirements and Procedures

1. **High Mileage Testing.** For LEV II vehicles, at least one vehicle from each test group must be tested at a minimum of 90,000 miles rather than the 75,000 miles.

2. **High Altitude Testing.** This provision does not apply in California.

3. **NMOG/NMHC Test Ratios.** Staff is allowing a manufacturer to use NMOG/NMHC and formaldehyde/NMHC ratios developed at the time of certification in place of testing for oxygenates during in-use verification testing.

4. **Submittal of Information.** California is additionally requiring that a manufacturer must submit its method for random selection of positive owner response vehicles and has added clarifying language about submittal of the in-use test results.

Part II - Test Procedures

1. Staff is amending the durability demonstration requirements for flexible fuel vehicles to conform with the CAP 2000 amendments. (Section 100.3.4(d)(2))

3. Summary of Proposed Modifications to ZEV/HEV Test Procedures

The amendments to these procedures are described in Part II of the staff report.